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MP-127
(Project 20.740)

MEMORANDUM TO: Chief, St/FR
THROUGH : Chief, Materials Division

11 August 1955

FROM : Chief, Ferrous Metals

SUBJECT : Project 20.740 "Pig Iron in the Soviet Bloc"

REFERENCE : Project action memorandum dated 1 August 1955

In response to the referenced memorandum the attached 4 copies of the Ferrous Metals Branch contribution to Project 20.740, Pig Iron in the Soviet Bloc, are submitted.

[redacted]

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Attachment:
Project 20.740 (Original and 3 copies)

F/M/RR
WDH:egs
11 August 55

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The Current Aluminum Situation in the Soviet Bloc

I. Resources

In 1954 the Soviet Bloc had about 17 percent of the world's known reserves of bauxite. This percentage was made up by the deposits of Hungary, the USSR, and Rumania, which are the only Bloc countries with significant resources of commercial grade bauxite.

The Hungarian reserves -- the largest in Europe -- are estimated to range from 200 to 270 million metric tons. * 1/, 2/ This quantity represents roughly 13 percent of the world total reserve of bauxite. Of the Hungarian portion, an estimated 65 million tons is of high quality and can be processed by standard European practice. 3/ In Hungary, bauxite deposits have been exploited in the Transdanubian area southwest of Budapest, with major operations being carried on in the vicinity of the villages of Gant, Iszkaszentgyorgy, Halimba, Eplany, and Tapolcsa.

The USSR has an estimated reserve of 40 million tons of bauxite, 4/ which compares favorably with the US reserve total. In addition, the USSR has large deposits of potential aluminum ores other than bauxite. Despite the efforts of an extensive Soviet research and development program, processes to exploit these ores in an economic manner have not yet been developed. 5/ The major bauxite deposits in the USSR are at Tikhvin (Boksitogorsk), at Sokolovskoye and Alapayevsk in the

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* Throughout this report tonnages are given in metric tons.

central Urals, at Krasnaya Shapotchka in the northern Urals, in the Solsir Mountains of West Siberia, and at Tartarishkoye in East Siberia.

The bauxite reserves of Rumania are estimated at about 20 million tons. 6/ These are located principally in the west central part of the country adjacent to Bihor and Topamfalva.

II. Production

A. Bauxite

In 1954 the Soviet Bloc produced about 2,265,000 tons of bauxite, which was approximately 15 percent of the world's total supply. Of the total Bloc output, Hungary's production accounted for 57 percent, 7/ the USSR's 40 percent, 8/ and Rumania's 3 percent. 9/ Mining and processing operations involved in producing these quantities are comparable to those used in the Free World.

B. Aluminum

The Soviet Bloc produces a proportionately larger share of the world's aluminum than it does bauxite: in 1954 approximately 18 percent of the world's aluminum production came from the Soviet Bloc, but only 15 percent of the bauxite production. This situation results primarily from two factors -- in the Soviet Bloc a larger share of the bauxite produced goes into aluminum production than is the case in the Free World; and aluminum oxide is also obtained from ores other than bauxite, although this operation is considered uneconomic at this time.

Of the total output of aluminum in the Soviet Bloc in 1954,

nearly 85 percent came from the USSR. Most of the remainder was divided among Hungary, East Germany, and Czechoslovakia. Production estimates for each component of the Soviet Bloc are presented in Table 1.

The aluminum reduction facilities in the USSR are relatively large plants, similar in many ways to those in the US and West Germany. The major difference between the Soviet plants and those in the Free World is that those in the USSR are more completely integrated; that is, the operation begins with the manufacture of aluminum metal and ends with the production of an end product. The aluminum plants in the European Satellites are, however, considerably smaller. Their size is limited because of smaller domestic requirements and also by a deficiency of electric power. Salient characteristics of aluminum producing facilities in the USSR are shown in Table 2, and those in the European Satellites are shown in Table 3.

Table 1

Estimated Production of Aluminum*
in the Soviet Bloc, 1952-55

Thousand Metric Tons

Country	Production 1952	1953	1954	1955	EME
Albania	0	0	0	0	± 0
Bulgaria	0	0	0	0	± 0
Czechoslovakia	0	3,000 a/	18,000 b/c/	20,000 b/ c/	± 10
East Germany	10,000 d/	16,000 e/	27,000 f/	27,000 f/	± 5
Hungary	26,000 g/	30,000 g/	33,000 h/	40,000 c/	± 5
Poland	0	0	3,000 a/	12,000 i/ j/	± 10
Rumania	0	0	2,000 k/	2,000 k/	± 10
USSR	220,000 l/	330,000 m/	440,000 m/	515,000 n/ o/	± 10
Total	256,000	379,000	523,000	616,000	± 10

* Primary ingot metal.

a. Based on an operating rate of 25 percent of rated capacity for one-half year.

b. Planned capacity.

c. 10/

d. 11/

e. 12/

f. 13/

g. 14/

h. 15/

i. 16/

j. Based on a 25 percent decrease from the maximum estimate.

k. 17/

l. 18/

m. 19/

n. Based on a plant capacity of 600,000 tons less 15 percent.

o. 20/

Table II

1954 Estimated Soviet Bloc Primary Aluminum Production Facilities

in 1000's of Metric Tons a/

Economic Region	Location City and Coordinates	Name of Plant	Alumina Production	Alumina Ore Type b/	Aluminum Plant Capacity	Aluminum Estimated Production	Power Type c/
I.	Volkhov 59-54/32-31	Volkhov Aluminum Works (VAZ)	50 d/	B	50 e/	45 f/	H
I.	Tikhvin (Boksitogorsk) 59-30/33-30	Tikhvin Works TOZ	25 d/	B			
I.	Kandalaksha 67-09/32-26	Kandalaksha Aluminum Works (KAZ)	5 e/	NS	20 e/	15 f/	H
III.	Zaporozhye 27-49/35-11	Dnepr Aluminum (DAZ)	115 g/	B	60 e/	50 f/	H
V.	Yevevan 40-11/44-30	Yevevan Aluminum Works		A&B	75 e/	65 f/	H
V.	Sumgait 40-33/49-37	Sumgait Aluminum Works	30 g/	A&B	50 e/	40 f/	T
III.	Kamensk-Uralskiy 56-24/61-50	Ural Aluminum (UAZ)	230 e/	B	120 e/	90 f/	T
III.	Krasnotur'insk 59-49/60-15	Bogoslovskiy Works (BAZ)	180 g/	B	100 e/	85 f/	T
II.	Stalinsk 53-44/87-10	Stalinsk Aluminum Works (STAZ)	125 h/	B	55 b/	50 f/	T
		Total	760		530	400	

a/ Aluminum plants under construction at Stalingrad, Irkutsk, and Chevepovets. Aluminum producing facilities have been reported at Irgiz, Molotov, Kemerovo, Tashkent, Rybinsk, Omsk, and Orsk. No definitive information has been obtained to determine the actual type or status of operation.

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b. B = bauxite, NS = Nepheline syenite A = alunite

c. H = hydroelectric power source T = Thermal power source

d. 21/

e. 22/

f. Based on an adjusted percentage of 15 percent less than the annual rated capacity.

g. 23/

h. Based on estimated capacity necessary to fulfill requirements of reduction plant at this location.

Table III

1954 Estimated Bauxite Primary Aluminum Production Facilities
in 1000's of Metric Tons

Economic Region	Location City and Coordinates	Name of Plant	Alumina Production	Alumina Ore Type a/	Plant Capacity	Aluminum Production (Est.)	Power Type b/
Hungary	Magyarovar 47-43/17-16	Magyarovar Alumina Plant	35 c/	B			
	Ajka 47-06/17-33	Ajka Aluminum Plant	60 c/	B	11 c/	11 c/	T
	Almasfuzito 47-44/18-15	Dunvolgyi Timfoldipari RT	115 c/	B			
Czechoslovakia	Tata Banya 47-33/18-27	Falsegolla Reduction Works	-	-	11 c/	11 c/	T
	Inota 47-12/18-10	Inota Aluminum Plant	-	-	18 c/	11 d/	T
	Svaty Kriz nad Hronom 48-33/18-56	Hronstav Aluminum Combine	-	-	20 e/	18 e/	H
Poland	Skawina 49-59/19-50	Huta Aluminum W Skawina	-	-	20 f/	3 g/	T
Rumania	Tarnaveni 46-19/24-14	Dicicosan Martin Chemical and Aluminum Plant	-	-	5 h/	2 i/	T
East Germany	Lauta 51-27/14-07	VEB Chemiewerk Lauta	65 j/	B	-	-	-
East Germany	Bitterfeld 51-37/12-18	Electrochemische Kombinate Bitterfeld (EKB)	-	-	30 k/	27 l/	T
		Total	275		115	83	

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a. B = bauxite

b. H = hydroelectric power source T = Thermal power source

c. 24/

d. 25/

e. 26/

f. 27/

g. Based on an operating rate of 25 percent of rated capacity for one-half year.

h. 28/

i. CIA, CS-[redacted], 24 March 1954, Op cit.

j. Estimated production necessary to sustain domestic requirements.

k. 29/

l. 30/

III. Trade

A. East-West

1. Bauxite -- No reports have been received indicating that the Soviet Bloc has exported bauxite to the West. On the other hand, the Bloc has been known to import bauxite from the West. Such shipments have been confined to sporadic shipments from Greece to the Soviet Union. The quantities involved are too small to be of strategic significance.

2. Aluminum -- Of the total world supply of primary aluminum in 1954, only a small quantity was involved in East-West trade. Aluminum ingot is on COCOM List II and in 1955 COCOM established a quota of 11,000 tons of aluminum for export to the Soviet Bloc. 30/ Of this quantity, Norway has been allocated 3,500 tons, 31/ which was in line with the historical pattern for Norwegian-Bloc aluminum trade. The bulk of the remaining tonnage is expected to be shared by Japan, Italy, and the UK, but to May 31, 1955 only 534 kilograms of the 7,500 tons had been subscribed. 32/ Aluminum hard-alloys, used in aircraft construction, are on International List I.

Although information on East-West trade in aluminum is scanty, the over-all supply/demand situation indicates that such trade is very small. The USSR, with an adequate supply of the metal, has not been active in the world market as a purchaser. The major incentive for large-scale Soviet purchases of aluminum from the West would probably be for a strategic stockpile, and there is no evidence that imports have been or are to be used in such a program. Of the European Satellites involved in East-West trade in aluminum,

Poland, Czechoslovakia, and East Germany have been the largest importers. In 1954 it is estimated that the Soviet Bloc illegally imported about 18,000 tons of aluminum from the West: Poland, Czechoslovakia, East Germany, and the USSR each received about 4,000 tons of metal through clandestine channels. Rumania imported about 1,000 tons, while Hungary, Bulgaria, and Albania shared the remainder. It should be noted that there have been many illicit offers and counter-offers of aluminum. Determination of the extent of such negotiations and whether they were ever consummated has not been possible. As a maximum upper limit, if each such offer manifested itself in shipment, the total imported from the West would not exceed 70,000 tons. In view of the magnitude of the Bloc's total aluminum production, the quantity represented by this upper limit still is not too significant.

For the first time in the postwar period, the Soviet Bloc offered to sell aluminum to the West in 1955. In fact, Hungary actually shipped some aluminum to the Free World. The quantities offered and sold were, however, fairly small. This may be taken to indicate that the Bloc needed foreign exchange or wanted to exchange aluminum for copper, which is in very short supply, rather than having a salable surplus of aluminum in the commercial sense.

B. Intrabloc trade

1. Bauxite -- Hungary supplies significant quantities of bauxite to the USSR and East Germany. It is expected that Hungary will

also supply bauxite to the aluminum industries of Poland and Czechoslovakia when these countries install processing facilities for the production of alumina. Rumania has made small shipments of bauxite to East Germany, but the USSR, the other Bloc producer of bauxite, does not have an exportable surplus.

2. Alumina -- Hungary also ships large quantities of alumina to other components of the Bloc. To the USSR, Hungarian shipments supplement the domestic production, but to Poland and Czechoslovakia Hungarian alumina represent just about the only large source available.

3. Aluminum -- The USSR exports aluminum to Albania, Bulgaria, and Rumania in sufficient quantity to fulfill most of the domestic demands of these countries. In 1954, the USSR supplied approximately half of the aluminum requirements of Poland and Czechoslovakia. Large quantities of aluminum ingot were exported for fabrication to East Germany by the USSR. Most of this metal returned to the USSR in the form of finished products.

Hungary exported about 80 percent of its aluminum production. Most of this aluminum was shipped to the USSR, with smaller quantities going to Poland, East Germany, and Czechoslovakia. East German aluminum shipments were largely confined to finished products destined for the USSR.

IV. Expansibility - Growth potential

A. Bauxite

Bauxite production in the Soviet Bloc can be readily expanded

to supply adequately the demands of any foreseeable expansion of the aluminum industry. Expansion plans and accelerated exploitation are expected only in Hungary, Rumania, and the USSR, the present producers. The emphasis of expansion will be in Hungary where no obstacles in bauxite mining or shortages of input items would prevent a steady increase in production to an annual rate of 2 million tons of ore a year. The demand for an output of this magnitude is not expected before 1960. It is believed that an annual rate of 1,800,000 tons will be adequate for the 1956-1959 period.

Bauxite production in the Soviet Union is expected to increase gradually from the current annual production rate of a million tons of ore to approximately 1,800,000 by 1959 when a leveling off is anticipated. Rumanian expansion will depend on the establishment of a large scale aluminum industry in Rumania or contiguous areas of USSR. An expansion of bauxite production in Rumania to about 600,000 tons annually by 1960 is feasible. By 1960 Soviet Bloc production of bauxite could reach about 3,800,000 tons annually, which would exceed the 1954 level of output by some 60%.

B. Alumina

Of the producers of alumina in the Soviet Bloc, Hungary is in the most economically favorable position to process its bauxite to alumina and ship this product to the aluminum plants in the USSR, Poland, Czechoslovakia, and East Germany. Its bauxite reserves are

large, transportation facilities are adequate, and skilled labor is available. Expansion plans are in progress and a potential market exists for double the current 200,000-ton alumina output.

C. Aluminum

The only significant expansion in the Soviet Bloc aluminum industry is expected in the Soviet Union where additions to present facilities and construction of several new, large, completely integrated plants are underway. A constant increase in capacity is expected each year during the 1955-60 period , which will enable an increase in production from an estimated 515,000 tons in 1955 to approximately 765,000 tons by 1960. This increase is parallel to the expansion programs of the US and of the Free World. The consuming market in the USSR is not, however, expected to be able to absorb all of this aluminum. Significant tonnages of metal may be exported or allocated to the USSR strategic stockpile.

The lack of an electric power potential sufficient to sustain a large scale aluminum expansion limits the aluminum industries of the European Satellites to the present level. The one possible exception to this is Rumania where the large aluminum plant that is in the planning stage will probably obtain its primary energy from natural gas. With the completion of the present aluminum construction program this year the European Satellites will have sufficient aluminum for their own needs, and may have a small exportable surplus. There is no forseeable shortage in input items necessary to fulfill expansion plans of the Soviet Bloc aluminum industry.

1. [redacted] 25X1A2g

2. ATIC Study No. 102-AE-54/6-5, 15 Feb 1955, The Present Status and Future Capability of Hungary in AIR-Weapons Metallurgy, P 44, S, B-2.

3. IBID.

4. [redacted] 25X1C8a

5. IBID, Par. 8, P 6.

6. [redacted] 25X1A2g

7.

8. Vaeth, "Aluminiumbedarf und Aluminium-Produktion", Marz 1955, p 213, Uncl. Uneval.

9. [redacted] 25X1A2g

10.

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14. Die Wirtschaft des Ostblocks (Bonel O/R,)7 April 1955, p 6, U.

15. [redacted] 25X1A2g

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18. ATIC Study No. 102-AE-52/3-34, 1 July 1952, The Status of AIR CRAFT Metallurgy in the USSR (Aluminum) (R) p 43, S, B-2.

19. A. Vaeth, op. cit. p 215.

20. Alluminio Vol XXIV n. 2, Marz 1955, p 196, Uncl, Uneval.

21. Zee, G.D. The Aluminum Industry of the USSR and Satellite Nations, Feb 1955, Report A-2, Council for Economic and Industry Research, Inc. p 38, Uncl., Uneval.

22. Alluminio op cit.

23. ATIC Study No 102-AE-52/3-34 Op cit.

24. [redacted] 25X1A2g

25.

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28. STATE -Bucharest, Dec 1950, Buletinael Official No 117 (551714) Law of the Five Year Plan Uncl. Uneval.

29. CIA FRD Report No. 31, 3 Aug 1953, The USSR Five Year Plan 1951-1955, p 33, S, US Officials Only, Unoval.

30. [redacted] 25X1A2g

31. IRRD.

32. [redacted] 25X1C8a

ORR Project 20.740
COKING COALS IN THE SOVIET BLOC

CONTENTS

COKING COALS IN THE SOVIET BLOC

Summary

Expansion of the coking coal base is one of the most critical and difficult problems faced by the Soviet Bloc in its plans for expansion of heavy industry.

Seemingly adequate reserves of coking coals are available for the Bloc as a whole. Their complete exploitation is limited to a large extent, however, by qualitative characteristics and by the remote location of coking coal deposits with respect to many coke plants. The principal coking coal resources are in the USSR, Poland, and Czechoslovakia.

Total Bloc production of coking coals in 1954 is estimated to be approximately 81.5 million tons.* The USSR produces about 68 percent of the total, and along with Poland and Czechoslovakia produces about 99 percent of the coking coal in the Bloc.

The Bloc must depend on the exploitation of new deposits and on technological improvements in blending and coking for any substantial increase in its coking coal base. Otherwise it will have to depend on sources of supply outside the Bloc, probably the United States.

The USSR, Poland and Czechoslovakia are self-sufficient in coking coals, and export coal to other Bloc countries. The major movement, from Poland to East Germany, is larger than all other Bloc trade in coking coals combined. Free-world trade with the Bloc in coking coals is very small. Austria receives coals from Poland and Czechoslovakia, and Japan imports small amounts from the USSR.

* Metric tons are used throughout this report.

INTRODUCTION

This report briefly describes the coking coal base of the USSR and its European Satellites, referred to in this report as the Soviet Bloc. Quantitative estimates contain a wide range of error.

"Coking coals" within the scope of this report are defined as those coals used to make high-temperature coke. It necessarily covers a relatively wide range of bituminous coals, a minor portion of which have poor or no coking properties. High-temperature coke includes, metallurgical coke, gas coke, and any other coke made at temperatures of 900°C and higher.

Expansion of the coking coal base is one of the most critical and difficult problems faced by the Soviet Bloc in its plans for the expansion of heavy industry.

RESOURCES

Estimates of total coking coal reserves in the USSR, 1/ Poland, 2/ and Czechoslovakia 3/ indicate an adequate supply of these coals for centuries at current production rates for the Bloc as a whole. Despite these large reserves, however, many factors tend to limit their full exploitation. These factors include depletion of deposits of the better grades of coking coals, the rising impurity content even of the better grades of coking coals, and the shortage in many areas of complimentary types of coal for blending.

USSR: 4/ The principal deposits of coking coals, accessible and economically workable at the present time, are in the Donbas (Donets basin in the East Ukraine and Rostov oblasts), the Kuzbas (Kuznetsk basin in West Siberia), the Karaganda basin (in Kazakh SSR), and the Kizel basin (in the Western Urals).

The Donbas coals vary greatly in coking characteristics, but are generally high in ash and sulfur content, and require extensive preparation. This basin, the largest supplier of coking coals in the Bloc, is barely self-sufficient in these premium coals.

Kuzbas coals also vary in coking properties, but are relatively low in ash and sulfur content. This basin is the principal source of coking coals for the Urals coke plants, and is the sole source for Kuzbas plants.

Karaganda basin coals have fair coking properties, and their high ash content requires cleaning. Most, if not all, of these coals are coked at the Urals plants.

Kisel basin coals have poor coking characteristics and their use for metallurgical coke is limited to a small portion of the coking coal blends at Urals plants.

Minor deposits are being exploited in the Tkvarcheli and Tkibuli fields in Georgian SSR, at Suchan, Noril'sk and Sakhalin.

The principal unexploited deposits of coking coal occur in the Karaganda basin and near Vorkuta in the Pechora basin.

The USSR has large reserves of coals with coking characteristics in its Asiatic areas, but they are not among the more desirable types for coking.

Poland: 5/ Polish reserves of coking coal are the second largest in continental Europe, being surpassed only by those of the Ruhr. The principal deposits of coking coals in Poland lie in the Upper and Lower Silesian basins. The former are the largest in extent, but they are essentially gas and steam

coals with mediocre coking characteristics. The Lower Silesian deposits are smaller but, they yield the best coking coals in Poland, producing a strong coke suitable for use in the metallurgical industry. In recent years considerable success has been achieved in blending coals from these two basins for the production of coke.

Czechoslovakia: 6/ Coking coals in Czechoslovakia are produced mainly from deposits in the Ostrava-Karvinna basin. These coals compare very favorably in quality with Ruhr coals. Coals in the Kladno basin are generally considered non-coking coals, but they have been blended successfully at one plant with Ostrava-Karvinna coals. Nesice basin high-sulfur coals are coked but not for use in blast furnaces.

The Ostrava-Karvinna basin (the southwestern extension of the Upper Silesian basin in Poland) is divided into the Ostrava and Karvinna districts. The former has good coking coals which lose some of their coking characteristics toward the eastern part of the district. Karvinna district coals are generally gas coals and do not make as good coke as do the Ostrava district coals.

East Germany: 7/ Coking coal reserves are near exhaustion in East Germany. Estimates are not directly available on coking coals, but reserves of hard coal (which include coking coals) being exploited in 1951 were expected to last only until 1960. A mine was under construction at that time in another hard coal deposit, which theretofore had been considered too difficult to mine. It is not known whether this mine is in production or not, or whether the coal is of coking quality.

Hungary: 8/ At the 1954 rate of production in Hungary bituminous coal reserves should last for 50 years. Estimates of coking coal reserves are not available, but would be included in the bituminous reserves.

Rumania, Bulgaria and Albania: 9/ Estimates of Rumanian and Bulgarian reserves of coking coals are unavailable. Hard coal reserves in Rumania are estimated to last about 60 years, and bituminous reserves in Bulgaria for 30-40 years, both at current rates of production.

Albania is not known to have any coking coal reserves.

PRODUCTION

The production of coking coals currently comprises an estimated 11 percent of total coal production in the Soviet Bloc. All but minor amounts are produced in the USSR (68 percent of Bloc coking coal), Poland (19 percent) and Czechoslovakia (12 percent). There is small production (1 percent) of these coals in East Germany, Hungary, Rumania and Bulgaria. Albania produces no coking coals.

The Donbas in the USSR produces more coking coals than all the Satellites combined. The Kuzbas in the USSR produces more of these coals than does Poland, the principal producer of coking coals in the Satellites.

Data are not available to estimate the production of the various types of coking coals in the Soviet Bloc. Depletion of deposits of the better grades of coking coals has led to the production of and use of, coals with inferior coking characteristics.

Estimates of the production of these coals by Bloc countries in 1952-55, are shown in Table 1.

TABLE 1

Production of Coking Coals in the Soviet Bloc
By Countries, 1952-55

(Million Metric Tons)

Country	1952	1953	1954	1955 a/
USSR b/	49.6	51.5	56.1	61.0
Poland c/	13.7	14.3	15.1	16.9
Czechoslovakia d/	9.3	9.9	10.5 e/	11.1
East Germany e/	0.3	0.3	0.4	0.4
Hungary f/	0.3	0.3	0.3	0.3
Rumania g/	0.1	0.1	0.1	0.1
Bulgaria g/	h/	h/	h/	h/
Albania g/	0.0	0.0	0.0	0.0
Total	72.3	76.4	81.5	89.8

a. Estimated on the basis of production trends.

b. 10/

c. 11/

d. 12/

e. Assuming coal consigned for high-temperature coke 13/ is indigenous production.

f. 14/

g. 15/

h. Less than 50,000 tons.

EXPANSIBILITY 16/

Currently the Bloc as a whole is self-sufficient in coking coals. Within the Bloc, however, the availability of coking coals varies from country to country in the European Satellites, and from area to area within the USSR. The depletion of reserves of the better grades of these premium coals, and the concurrent deterioration of quality, are retarding the expansion of the coking coal base.

Three major steps have been taken in the Bloc to expand the coking coal base; (1) The exploration and development of new deposits of high-grade coking coals, (2) the up-grading of coking coals by mechanical preparation, and (3) technological improvements in blending and coking coals.

The first has been the least fruitful. The development of the Tom-Usinsk area in the Kuzbas, USSR, is the only significant addition to the coking coal base in the Bloc in recent years. Expansion and further development of deposits of coking coals in the Karaganda and Pechora basins in the USSR probably will provide further expansion of the coking coal base. Other countries of the Bloc, however, do not have such a potential for expansion.

The second step has been highly successful, particularly in the USSR. Mechanical preparation permits the use of vast tonnages of high-grade coking coals which, because of high impurity content, could not otherwise be used. Practically all new mines and most of the old mines are now equipped with modern preparation plants. Preparation has contributed greatly to the post-war expansion of the coking coal base. The role of preparation in the future expansion of this base, although extremely important, will be secondary to the development of new deposits and technological improvements in blending and coking.

The third step, technological improvements in blending and coking, has been and will continue to provide the principal means of expansion. For example, the use of weakly-caking gas coals of the Donbas in coking coal blends increased from 7.6 percent in 1940 to 11.0 percent in 1952. Similar increases have been made in the use of gas coals in other Bloc countries.

Nevertheless, the limited reserves of high-grade coking coals requires that any substantial expansion of the Bloc's coking coal base must come from the use of inferior coking coals in increasing amounts.

Several substitute fuels have been investigated for coking, but their application has been so limited and costly that their influence on the coking coal base thus far has been negligible. Chief among these were commercial-scale tests with East German brown coal at Lauchhammer. 20/ Although a brown coal coke was made it was not suitable for metallurgical use. The use of such coke for other than metallurgical purposes would tend to free metallurgical coke for its intended purpose. In this respect the Soviet Bloc might expand its coke base, and indirectly its coking coal base.

A new coking process recently developed in Western Europe, and a new Polish method for evaluating coking coals are examples of positive technological developments which will contribute to the expansion of the coking coal base of the Bloc. 21/ Unless such developments proceed at a higher rate, however, the Soviet Bloc may have to rely on coking coal sources outside the Bloc in the near future. Since the coking coal situation in Western Europe is almost as critical as in the Bloc, such coals might have to come from the United States.

TRADE

(a) With the Free World. Soviet Bloc - Free World trade in coking coals is very small. It is roughly estimated that about one-half of Austria's imports of bituminous coal from Poland and Czechoslovakia during the period 1952-1955 were used to make coke. 17/ This would indicate imports of coking

coals from these two Bloc countries of about 500,000 and 100,000 metric tons, respectively. Japan has imported annually 100,000 tons or less of USSR coking coals since 1951. 18/

(b) Intra-Bloc. The major movement of coking coals within the Soviet Bloc is from Poland to East Germany. This single movement is larger than all other Bloc trade in coking coals combined. Poland also supplies Hungary, Rumania, and possible Czechoslovakia with small amounts of these coals. 19/

Czechoslovakia is probably a net exporter of coking coals, supplying a large portion of Hungary's requirements for these coals, and possibly a small amount to East Germany. Czechoslovakia's imports of Polish coals might include coking coals.

East Germany depends primarily on Poland, and to a lesser extent, on Czechoslovakia for its supply of coking coals.

Hungary depends upon Czechoslovakia and Poland for approximately one-half of its coking coal requirements.

Rumania imports coking coals from Poland and the USSR.

Albania and Bulgaria do not import or export coking coals.

The USSR exports only a very small amount of coking coal to Rumania. Some of the Polish hard coal imported into the USSR might include coking coal.

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